

March 21, 1889.

Professor G. G. STOKES, D.C.L., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read:—

- I. "On the Velocity of Transmission through Sea-water of Disturbances of large Amplitude caused by Explosions." By RICHARD THRELFALL, M.A., Professor of Physics, and JOHN FREDERICK ADAIR, M.A., Demonstrator of Physics, University of Sydney. Communicated by Professor J. J. THOMSON, F.R.S. Received March 14, 1889.

(Abstract.)

This paper contains an account of a large number of experiments made with the object of determining the velocity of waves of compression caused by explosions under water.

The method adopted depended on the use of a certain "gauge" devised for the occasion, whereby the arrival of the disturbance at a given point was transmitted to a chronograph.

The disturbances themselves were caused by submarine explosions of dynamite and guncotton in quantities varying from nine ounces to four pounds.

The distance over which the velocity was measured was about 200 yards.

The water was that of the Pacific Ocean in the harbour of Port Jackson, N.S. Wales.

The chronograph was of the falling pendulum description, and fired the charge automatically.

The absolute time was obtained by comparing the chronograph tuning fork with an astronomical clock.

The distance was obtained in terms of the standard yard of N.S. Wales by means of trigonometrical survey. The chief results for the range quoted are as follows:—

Class.	Description of explosive.	Number of experiments (each experiment involving two explosions and time measurements).	Velocity found in metres per second.	Temperature C.	Velocity of sound calculated in metres per second.	Excess of velocity as compared with velocity of sound.
A	9 oz. dry guncotton.	11	1732 ± 22	$17^{\circ}8$	1523	per cent. 13·75
B	10 oz. No. 1 dynamite	24	1775 ± 27	$14^{\circ}5$	1508	17·7
C	18 oz. dry guncotton.	5	1942 ± 8	$18^{\circ}3$	1525	27·3
D	64 oz. dry guncotton.	3	2013 ± 35	$19^{\circ}0$	1528	31·7

The chief portion of the paper is occupied by a description of the details of the precautions taken to make the measurements as accurate as possible.

II. "An Experimental Investigation of the Circumstances under which a Change of the Velocity in the Propagation of the Ignition of an Explosive Gaseous Mixture takes place in closed and open Vessels. Part I. Chronographic Measurements." By FREDERICK J. SMITH, M.A., Millard Lecturer, Exptl. Mech., Trin. Coll., Oxford. Communicated by A. G. VERNON HARCOURT, F.R.S. Received March 12, 1889.

(Abstract.)

The subject of the paper of which this is an abstract, is the determination of the rate of change of the velocity of the propagation of an explosion in gaseous explosive mixtures.

It has been noticed by several investigators, viz., MM. Berthelot and Vieille, MM. Mallard and Le Chatelier, and Professor H. B. Dixon, F.R.S., that explosive gaseous mixtures after ignition do not reach their maximum velocity of propagation at once, but that a certain maximum velocity is attained soon after initial ignition.

In order to investigate this interesting period, which may be called the acceleration period of an explosion, chronographic measurements of a peculiar nature were found necessary.

It was at once evident that but little advance in this branch of the subject of explosions could be made unless exceedingly minute periods of time could be measured with certainty.